



# AEC-NASA TECH BRIEF



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## Gambit Program

### The problem:

To provide multigroup flux and current averaged neutron cross section for input to transport programs.

### The solution:

The GAMBIT computer program, including a thermal neutron cross-section of 99 fine groups (0–2.38eV) and a fast neutron library consisting of 68 fine groups (0.414eV – 10MeV, 1/4 lethargy intervals). The program provides cross sections for a full P(1) transport calculation.

Cards are punched out in a format suitable for input to the ANISN and DOT discrete ordinates transport codes. Other output options are available.

### How it's done:

The GAMBIT program is similar to the Gulf General Atomic GAMGATHER program. There is an independent calculation for the thermal region, BIT program, and also for the fast region, GAM program. Each program provides solutions to the time and space independent Boltzmann equation in the P(1) or B(1) approximations when a buckling term is input. The GAM and BIT programs are linked by the transfer coefficients which are calculated in the linkage subroutine that provides the printed and punched output.

The GAM program is a modified GAM-1 program, using the QUERY program for handling resonance absorption. In BIT, accurate solutions to the GAMGATHER type of equations are obtained by iterating on a direct solution. After being in production usage for about a year, converged results have been obtained in all cases and within reasonable computer times.

The transfer coefficients in the linkage subroutine are based on the monatomic gas model.

The GAMBIT cross section libraries have been developed over the past eight years. There are cross sections for more than 100 isotopes in the GAM and BIT libraries. The fast neutron cross compilation includes P(0) and P(1) elastic scattering transfer matrices, inelastic scattering matrices, n,2n cross section matrices, absorption and fission cross sections for all isotopes.

Broad-group cross sections may be generated from these cross sections using fluxes and currents calculated with GAMBIT or fluxes and currents that are input to the program.

### Notes:

1. The program is written in FORTRAN IV language for use on the CDC-6600 computer.
2. Inquiries should be made to:  
COSMIC  
Computer Center  
University of Georgia  
Athens, Georgia 30601  
Reference: B69-10433

### Patent status:

No patent action is contemplated by NASA.

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